

WHAT IS CLAIMED IS:

1. An internal condition detection system for a charge accumulating device comprising:

a charge accumulating device for supplying power to an electric system;

5 a current detecting means for detecting a charging and discharging current of the charge accumulating device; and

a voltage detecting means for detecting a terminal voltage of the charge accumulating device; and

10 a condition detecting means for detecting an internal condition of the charge accumulating device by learning an internal condition quantity of the charge accumulating device through a neural network which is fed with current values and terminal voltage values output from the current detecting means and the voltage detecting means, respectively,

15 wherein the current values and the terminal voltage values are supplied so that historical information thereof are included.

2. The internal condition detection system for a charge accumulating device according to claim 1,

20 wherein the historical information is constituted of time-series data obtained by digitally sampling the current values and the terminal voltage values, and

wherein the time-series data is accumulated and then inputted to an input layer of the neural network.

25 3. The internal condition detection system for a charge accumulating device according to claim 2,

wherein data obtained by superposing a time frame on time-series data constituting the historical information and cutting the data is inputted to the input layer of the neural network.

5 4. The internal condition detection system for a charge accumulating device according to claim 2,

 wherein a time interval of sampled data inputted is made longer as it goes farther back into the past from an internal condition quantity learning time with respect to time-series data constituting the historical information.

10 5. The internal condition detection system for a charge accumulating device according to claim 1,

 wherein the internal condition quantity of the charge accumulating device is a dischargeable remaining capacity.

15 6. The internal condition detection system for a charge accumulating device according to claim 1,

 wherein the internal condition quantity of the charge accumulating device is an internal impedance of the charge accumulating device.

20 7. The internal condition detection system for a charge accumulating device for vehicle according to claim 1,

 wherein the internal condition quantity of the charge accumulating device is a dischargeable remaining capacity of the charge accumulating device
25 and an internal impedance of the charge accumulating device.

8. The internal condition detection system for a charge accumulating device according to claim 1,

wherein the neural network is fed with condition quantities related to the temperature of the charge accumulating device.

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9. The internal condition detection system for a charge accumulating device according to claim 1, further comprising:

a first learning means which, with respect to the input of the current values whose amount of fluctuation due to variation is within a first predetermined range, learns the internal condition of the charge accumulating device and produces an output.

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10. The internal condition detection system for a charge accumulating device according to Claim 9, further comprising:

a second learning means which, with respect to the input of the current values whose amount of fluctuation is within a second predetermined range larger than the first predetermined range, learns the internal condition of the charge accumulating device and produces the output.

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11. The internal condition detection system for a charge accumulating device according to claim 9,

wherein the amount of fluctuation is computed using a variance or standard deviation of the current values.

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12. The internal condition detection system for a charge accumulating device according to claim 1, further comprising:

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a charging current learning means which, with respect to the input of the charging current values, learns the internal condition of the charge accumulating device and produces output.

5 13. The internal condition detection system for a charge accumulating device according to claim 1, further comprising:

 a discharging current learning means which, with respect to the input of the discharging current value, learns the internal condition of the charge accumulating device and produces output.

10 14. The internal condition detection system for a charge accumulating device according to claim 1,

 wherein the current values and the terminal voltage values are supplied so that correlation data correlated with the historical information is included.

15 15. The internal condition detection system for a charge accumulating device according to claim 14,

 wherein the correlation data is gradient and intercepts obtained by the least squares method or matching error.

20 16. The internal condition detection system for a charge accumulating device according to claim 1,

 wherein the internal condition quantity of the charge accumulating device is a ratio of the dischargeable remaining capacity to a full charge capacity
25 of the charge accumulating device.

17. The internal condition detection system for a charge accumulating device according to claim 1, further comprising:

a charged input stopping means which, when the charge accumulating device is charged during learning, prevents the input of the current values and the terminal voltage values to the neural network until energy charged in the charge accumulating device is discharged.

18. An internal condition detection system for a charge accumulating device comprising:

a charge accumulating device for supplying power to an electric system;
a current detecting means for detecting a charging and discharging current of the charge accumulating device;

a voltage detecting means for detecting a terminal voltage of the charge accumulating device; and

an internal condition detecting means for detecting an internal condition of the charge accumulating device by learning an internal condition quantity of the charge accumulating device through a neural network which is fed with current values and terminal voltage values of the charge accumulating device and producing an output,

wherein the neural network is fed with type information indicative of types of the charge accumulating device.

19. The internal condition detection system for a charge accumulating device according to claim 18,

wherein the type information is digitized and inputted to the neural network.

20. The internal condition detection system for a charge accumulating device according to claim 19,

wherein the type information is represented as continuous quantity and is a numerical value correlated with an hour rate capacity.

21. The internal condition detection system for a charge accumulating device according to claim 19,

wherein the type information is represented as continuous quantity and is a numerical value correlated with an internal impedance of the charge accumulating device.

22. The internal condition detection system for a charge accumulating device according to claim 18,

wherein the neural network is supplied with the current values and the terminal voltage values so that historical information is included.

23. The internal condition detection system for a charge accumulating device according to claim 22,

wherein the historical information is comprised of time-series data obtained by digitally sampling the current values and the terminal voltage values and the time-series data is accumulated and inputted to an input layer of the neural network.

24. The internal condition detection system for a charge accumulating device according to claim 23,

wherein data obtained by superposing a time frame on time-series data constituting the historical information and cutting the data is inputted to the input layer of the neural network.

5 25. The internal condition detection system for a charge accumulating device according to claim 23,

 wherein with respect to time-series data constituting the historical information, a time interval of sampled data inputted is made longer as it goes farther back into the past from an internal condition quantity learning time.

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26. The internal condition detection system for a charge accumulating device for vehicle according to claim 18,

 wherein the internal condition quantity of the charge accumulating device is a dischargeable remaining capacity.

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27. The internal condition detection system for a charge accumulating device according to claim 18,

 wherein the internal condition quantity of the charge accumulating device is the internal impedance of the charge accumulating device.

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28. The internal condition detection system for a charge accumulating device according to claim 18,

 wherein the neural network is fed with condition quantities related to the temperature of the charge accumulating device.